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The effect of alternative work schedules (AWS) on performance during acquisition based testing at the U.S. Army Aberdeen Test Center

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THE EFFECT OF ALTERNATIVE WORK SCHEDULES (AWS) ON PERFORMANCE DURING ACQUISITION BASED TESTING AT THE U.S. ARMY ABERDEEN TEST CENTER

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September 2014

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ABSTRACT

This project analyzed the effects of an alternate work schedule (AWS) on the performance of acquisition based testing conducted at the U.S. Army Aberdeen Test Center (ATC), a subordinate test center to the U.S. Army Test and Evaluation Command. The literature review uncovered how an AWS improved employee work and life balance and performance at three separate external companies. Other potential AWS success factors such as employee absenteeism, environmental impact, health and safety were analyzed for advantages and disadvantages, and compared to ATC. Finally, an analysis of ATC test data revealed that performance varies depending on project type. Automotive test data showed a four percent increase in performance during an AWS while body armor test data showed no difference in performance. Ultimately, the marginal increase in testing performance and other identified advantages make an AWS an ideal schedule for ATC.

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LIST OF ACRONYMS AND ABBREVIATIONS

AEC	Army Evaluation Center
ATC	Aberdeen Test Center
ATAAPS	Automated Time Attendance and Production System
ATEC	Army Test and Evaluation Command
AWS	alternate work schedule
CCIR	commander's critical incident reporting
CECOM	Communications-Electronics Command
DEOMI	Defense Equal Opportunity Management Institute
DOD	Department of Defense
DPG	Dugway Proving Ground
EPG	Electronic Proving Ground
FWS	flexible work arrangements
FY	fiscal year
MATV	military all-terrain vehicle
MG	major general
O&M	operations and maintenance
OPM	Office of Personnel Management
OTC	Operational Test Center
PP	pay period
RAM	reliability, availability, and maintainability
RDO	regular day off
RDT&E	research, development, test and evaluation
RTC	Redstone Test Center
T&E	test and evaluation
TI	Texas Instruments
WSMR	White Sands Missile Range
YPG	Yuma Proving Ground

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I. INTRODUCTION

The federal government, particularly the Department of Defense (DOD), is one of the largest consumers in the business world making acquisition a foundation for the national defense strategy and operations. This project detailed the effect of test and evaluation (T&E) on the acquisition life cycle process. Specifically, an analysis of the impact of alternative work schedules (AWS) on T&E performance was conducted at the U.S. Army Aberdeen Test Center (ATC), a subordinate to the U.S. Army Test and Evaluation Command (ATEC) headquartered at Aberdeen Proving Ground, Maryland.

A. BACKGROUND

Important facts, background information, and historical information presented in this section will serve as the foundation for understanding the remainder of this project.

1. Importance of Test and Evaluation in the Acquisition Process

> "We are the conscience of the American Soldier; on this, we never will compromise."
>
> Major General Genaro Dellarocco
> (Ret., Former Commander, ATEC), 2012

As Major General (MG) Dellarocco notes, T&E plays a critical role in the acquisition process by acting as an advocate for members of the Armed Forces (U.S. Army Test and Evaluation Command, n.d.). T&E helps to recognize requirements, develop evaluation strategies, plan and conduct tests, and analyze test data. This information is then provided to DOD decision makers before equipment and systems are fielded to the warfighter.

2. ATC Background

ATC, known as the U.S. Army Combat Systems Test Activity until 1995, is one of eight test centers under the U.S. Army Test and Evaluation Command (ATEC) (see Figure 1) (“History,” n.d.). ATC performs a full spectrum of testing, and is the Army’s Center of Excellence for automotive testing with 15 test courses of varying terrain and difficulty (U.S. Army Test and Evaluation Command, n.d.). The Automotive Directorate is responsible for “planning, conducting, analyzing and reporting the results of developmental tests, production tests, and other tests specifically focused in the areas of ground and amphibious manned and unmanned vehicles, vehicular weapons, and fire control systems” (“Automotive Directorate,” n.d.).

ATC is also the DOD’s lead test center for direct fire and operates 31 firing ranges (U.S. Army Test and Evaluation Command, n.d.). The Firepower Directorate handles direct fire and is responsible for “planning, conducting, analyzing and reporting the results of developmental tests, production tests, and other tests specifically focused in the areas of weapons and ammunition of all calibers, mine warfare systems, electric armaments, explosive devices and fragmentation” (“Firepower Directorate,” n.d.). The Automotive and Firepower Directorates perform the majority of system testing at ATC.

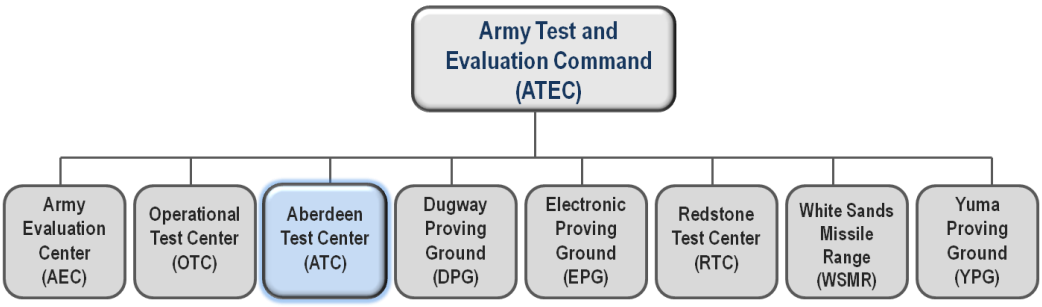

Figure 1. U.S. Army Test and Evaluation Command organizational structure

With a large work force consisting of both civilian and contractor employees, ATC continuously seeks ways to gain both test and business efficiencies, operate from ambitious performance schedules from the Program Management (PM) offices, and function under increasing fiscal constraints by Congress. One area of efficiency that is considered by ATC is the work schedule of employees.

3. Historical Review of ATC's Work Schedule

In July 1993, ATC transitioned its workforce members from a traditional work schedule to a type of alternate work schedule (AWS) known as a compressed work schedule. The traditional work schedule consisted of five eight-hour days each week, and is known as a 5-40 work schedule (Table 1). The AWS (also known as a 9-80 work schedule) consisted of four nine-hour days and one eight-hour day in the first week followed by four nine-hour days and one regular day off (RDO) in week two of the pay period (Table 2).

Table 1. Traditional schedule, by pay period

	S	M	T	W	Th	F	S
Week 1	**off**	**8**	**8**	**8**	**8**	**8**	**off**
Week 2	**off**	**8**	**8**	**8**	**8**	**8**	**off**

Table 2. Alternate work schedule, by pay period

	S	M	T	W	Th	F	S
Week 1	**off**	**9**	**9**	**9**	**9**	**8**	**off**
Week 2	**off**	**9**	**9**	**9**	**9**	**off**	**off**

4. Sequestration Necessitates Work Schedule Changes

When the United States Congressional Joint Select Committee on Deficit Reduction failed to agree on a plan to reduce the federal deficit by March 1, 2013, the Budget Control Act of 2011, also known as sequestration, went into effect. The act directed over $1 trillion in funding decrements be implemented across the federal government from 2013–2021 (“Budget Sequestration in 2013,” n.d.).

The first round of cuts in fiscal year (FY) 13 greatly impacted the DOD’s Operations and Maintenance (O&M) accounts. O&M appropriations are the primary funds used to operate the DOD (*Memorandum for Secretaries*, 2013). As a result, DOD was forced to develop a plan for reducing its spending by $454 billion over the next nine years (“Budget Sequestration in 2013,” n.d.). In May 2013, the DOD made the decision to impose 48 hours (six days) of furloughs on civilian workforce members in an effort to offset the reduction in funding. The furloughs were set to begin in July 2013 (*Memorandum for Secretaries,* 2013). Although ATC operates using research, development, testing and evaluation (RDT&E) appropriations, DOD policy mandated that all organizations participate in the furloughing of employees, regardless of their funding source (*Memorandum for Secretaries*, 2013). As an exception to the policy, organizations that performed activities categorized as “national security, protection of life and property, or activities necessary for the orderly phase down of other activities” were allowed to continue specific operations (“Furlough 2013 Questions and Answers,” 2013). No ATC employees were part of this exception.

On June 30, 2013 ATC transitioned back to a traditional work schedule in order to limit the impact of the upcoming administrative furloughs on the workforce. As directed by the DOD, furloughs were limited to eight hours a day and two days per pay period, with only one furlough day allowed each week (*Memorandum for Secretaries*, 2013). Remaining on the AWS would have resulted in at least one of the two furlough days per pay period being

implemented on a nine hour day. As a result, employees would have been required to travel to ATC to work for only one hour on furlough days that fell on a nine hour day.

Although the furlough period ended in August 2014, the entire ATC workforce remained on the traditional schedule until December 1, 2013. ATC continued to operate on the traditional schedule until after President Obama signed the Continuing Appropriations Act of 2014 on 16 October 2013. The act raised the debt ceiling, which verified that the risk of furloughs being re-implemented was minimal (Continuing Appropriations Act, 2014, 2014).

B. PROBLEM STATEMENT

ATC has a responsibility to ensure that it is supporting the acquisition process by remaining efficient during T&E. Research and analysis of efficiency data of real systems under test during the 2013 furlough and non-furlough periods will show the impact of an AWS on test performance. Currently, ATC uses an AWS but has yet to verify through research or data analysis, the advantages and disadvantages of the practice. If an AWS is not shown to be beneficial, it may be practical for ATC to reconsider and/or modify its current policy.

C. PURPOSE

There is no known evidence showing whether ATC's operations have been analyzed to determine whether there are any test performance efficiencies gained by using either the traditional schedule or AWS. Because the test center has specially designed instrumentation and processes to capture test data, ATC has the opportunity to conduct a detailed analysis of work schedule effects on testing performance. This will allow ATC to determine which type of work schedule has a greater impact on test performance. As ATC, like many DOD organizations, continues to face challenges associated with decreasing

resources and increasing scopes of work, better understanding the impact of work schedules on T&E performance will ensure the organization makes the best decisions and use of taxpayer dollars.

D. RESEARCH OBJECTIVES

The first objective was to identify other organizations who published any challenges and successes associated with a Traditional Schedule or AWS. To accomplish this objective the schedule type was researched using the following resources: case studies, electronic papers and articles.

The second objective of this research project was to carefully examine the theoretical advantages and disadvantages of an AWS. This objective was accomplished by researching existing literature and guidance on the use of AWS.

The third objective was to determine the impact of an AWS on performance during testing at ATC. This objective was accomplished by collecting and analyzing previously recorded test data from ATC databases. These databases contain data obtained from test records and instrumentation on items under test during implementation of both alternate and traditional work schedules.

The fourth objective was to provide an analysis of ATC against the benefits, advantages, and disadvantages identified Chapter II.

The fifth objective was to recommend the most efficient work schedule to ATC leadership. The traditional schedule served as a baseline for the purpose of comparison.

E. RESEARCH QUESTIONS

Research Question 1: Can ATC use other organizations as a model for improving operations through schedule changes?

Research Question 2: What are the advantages or disadvantages of an AWS?

Research Question 3: Can test efficiencies be gained through working an AWS as opposed to a traditional schedule?

F. DEFINITIONS

Definitions that are key to understanding the context of information examined in this project will be outlined in sections F (1) through F (3).

1. Alternate Work Schedule

An AWS for the purpose of this research project is defined by the OPM as "both flexible work schedules and compressed work schedules" (Office of Personnel Management, n.d.-b). Table 3 shows various work schedules allowable by OPM. ATC uses a compressed work schedule built around nine hour work days and one day off every other week.

Table 3. Work schedule types allowable by OPM

Flexhours	• "The times during the workday, workweek, or pay period within the tour of duty during which an employee covered by a flexible work schedule may choose to vary his or her times of arrival to and departure from the work site consistent with the duties and requirements of the position" (Office of Personnel Management, n.d.-b). • **Ex**. Starting work at six o'clock am and leaving at three o'clock pm.
Compressed Work Schedule	• "A fulltime employee works an 80-hour biweekly basic work requirement that is scheduled by an agency for less than 10 workdays" (Office of Personnel Management, n.d.-b). • **Ex**. Working 10 hours a day for four days a week or 9 hours a day with one day off every other week
Telework/ Telecommuting	• "[t]he term 'telework' or 'teleworking' refers to a work flexibility arrangement under which an employee performs the duties and responsibilities of such employee's position, and other authorized activities, from an approved worksite other than the location from

	which the employee would otherwise work" (Office of Personnel Management , 2011). • **Ex**. Working from home three days a week
Job sharing	• Two employees with part-time schedules fulfill the job functions of one full time employee (Office of Personnel Management, n.d.-a). • Each job sharer is allowed to work up to 32 hours per week.

2. Performance

The author's definition of performance for the purpose of this research project is defined as the measure of efficiency in completing a task. In this case the tasks are the total uptime or number of rounds fired during an eight or nine hour work day.

3. Uptime

Uptime is defined as the time during which a system is being tested. Uptime does not count set-up, tear-down, maintenance, repair, or employee breaks (e.g., lunch breaks).

G. SCOPE/ METHODOLOGY

This project focused on finding efficiencies in Acquisition based testing conducted at ATC. Electronic reports, organizational policies and brochures, and online articles were used to gain an understanding of the benefits of different work schedules. Test performance data collected by ATC was used to analyze test performance under the traditional and AWS.

The objectives of the project were: (1) to identify other organizations who published any challenges and successes associated with traditional or AWS; (2) to examine the main advantages and disadvantages of AWS; (3) to analyze test data from several areas within ATC and determine the impact of an AWS on

performance during testing and (4) to recommend the most efficient work schedule to ATC leadership. The following method was used to accomplish these objectives:

- Review case studies on organizations that have used AWS.
- Review articles and reports on the advantages and disadvantages of AWS.
- Compile data reports from acquisitioned items under test at ATC (vehicles, body armor, etc.).
- Analyze data reports from acquisitioned items under test at ATC (vehicles, body armor, etc.), comparing test efficiency during periods of traditional and AWS.
- Review previous ATC policies and procedures concerning work schedules.

H. ORGANIZATION OF THE REPORT

The information in this report is organized into the following chapters:

- **Chapter I**: Introduction—a description of the importance of the project and key background information that will aid in understanding the context and content of the report.
- **Chapter II**: Existing Literature Review—a review of case studies about three well-known organizations and their use of AWS and literature specific to AWS; a review of the advantages and disadvantages associated with AWS.
- **Chapter III:** Data Collection and Analysis—a description of the process used to collect data, an analysis of collected data and a list of findings and results.
- **Chapter IV:** Conclusion and Recommendations—summarizes what was learned from the previous chapters and offers recommendations.

I. SUMMARY OF CHAPTER

This chapter described important background information about ATC, ATC's work schedules and the impact of sequestration on ATC's works schedule. The chapter also identified a problem statement, the purpose of the project, research objectives and research questions. Specific definitions that were

identified as being essential to understanding the project were also provided. Lastly, the methodology used to perform the project was presented. The next chapter will discuss the review of existing literature.

II. LITERATURE REVIEW

A review of existing literature was conducted to examine the use of alternate work schedules by other companies and the advantages and disadvantages of AWS. Research questions one (can ATC use other organizations as a model for improving operations through schedule changes?) and two (what are the advantages or disadvantages of an alternate work schedule?) will be answered in this chapter. The first section will describe case studies of companies that have transitioned to AWS and the impact of those transitions. The second section will focus on several elements of an alternate work schedule. Lastly, a brief summary of the chapter will be provided.

A. CASE STUDIES

Three case studies have been performed on companies that used AWS to address challenges within the workplace. Although the companies examined do not perform Department of Defense testing like ATC, they do offer valuable insight into the use of non-traditional work schedules. Company profiles for KPMG LLP, Eastman Kodak and Texas Instruments (TI) are presented in Tables 4–6. Following each profile is a summary of the case study reviewed.

1. Case One

A company profile (see Table 4) and case study summary of KPMG, LLP are presented in the in the next section.

Table 4. KPMG, LLP company profile

Company Name	KPMG LLP
Company Type	Audit, tax and advisory firm
Number of Employees	Approximately 100,000

One of KPMG LLP's top goals is to be the employer of choice and retain employees. In order to achieve that goal, KPMG implemented several programs, one of which is workplace flexibility (Giglio n.d.-a). Workplace flexibility includes AWS options similar to those described by OPM (see Table 3) including: flextime, telecommuting, compressed work schedules and job sharing. All employees of KPMG are eligible to take advantage of the workplace flexibility option, and about 50 percent of the company's employees have chosen to take advantage of the program (Giglio n.d.-a).

A unique example of the workplace flexibility program at KPMG is the job sharing option. This option is attractive to employees who have a large amount of personal demands that can keep them from working a full work week (Giglio n.d.-a). Job sharing allows employees to reduce their hours to those of a part-time employee without negatively impacting their work. In job sharing, the employee is given a work job partner who also desires to work part-time hours (Giglio n.d.-a). Together, these employees are equally responsible for accomplishing the same job. As a result, the company's performance does not suffer due to employee's personal demands. Using job sharing and other workplace flexibility options, KPMG has been able to retain talented employees and business continuity (Giglio n.d.-a).

2. Case Two

A company profile (see Table 5) and case study summary on Eastman Kodak are presented in the in the next section.

Table 5. Eastman Kodak company profile

Company Name	Eastman Kodak
Company Type	"infoimaging"
Number of Employees	Approximately 39,000 in U.S.

In 1997, Eastman Kodak realized that it needed to offer employees more flexible work schedules in order to keep up with the changes in family structure and employee lifestyles (Litchfield, Swanberg, & Sigworth, 2004). Employees opinions on work and life balance had also evolved, but no adjustments by Kodak had been made. Kodak's attempt to ensure the impact of the aforementioned cultural changes came in the form of a formal flexible work arrangements policy. The policy offers employees the same options as OPM's AWS; including: part-time work, job sharing, flextime, compressed work schedules and telecommuting (also known as virtual office at Kodak).

Although Kodak, like ATC, has not analyzed data to prove that it is getting a "return-on-investment," the company believes providing employees' flexible work arrangement options ultimately increases employee performance (Litchfield, et al., 2004).. Kodak internally publicizes stories about the successful use of flexible work arrangements by employees and their supervisors to encourage others to use them (Litchfield, et al., 2004). One thing that Kodak recommends is conducting an assessment to determine the level of interest in flexible work arrangement (Litchfield, et al., 2004).

3. Case Three

A company profile (see Table 5) and case study summary on Eastman Kodak are presented in the in the next section.

Table 6. TI company profile

Company Name	Texas Instruments (TI)
Company Type	Technology
Number of Employees	19,400 in Americas

In 1993, Texas Instruments conducted a needs assessment survey. The results of the survey indicated that TI employees ranked flexibility within the workplace high on their list of cares (Giglio, n.d.-b). Employees also stated that TI had not made any effort to address those cares. This prompted TI to initiate a workplace flexibility program in hopes of improving a focus area valued by employees.

Texas instruments decided to offer most employees a type of ad hoc flexibility policy. Employees responsible for manufacturing-type jobs were not able to participate, but were given the opportunity to work a specific type of AWS, a compressed work schedule similar to the one used by ATC (Giglio, n.d.-b). The remainder of TI employees could adjust their schedules in an ad hoc manner to coincide with their personal needs. Employees are able to adjust their work schedules on a case-by–case basis (Giglio, n.d.-b).

Some examples of TI's policy are: employees come in late and work late; employees work from home if they are unable to come into the office (telework); employees that work late, come in later the next day. According to Giglio, TI believes this reduces the amount of time employees spend "worrying about outside matters," which increases performance (n.d.-b).

TI took the time to understand its corporate culture and as a result found success. According to Giglio, TI has not been aggressive in measuring the success of its program, but "believes the benefits include higher employee retention, reduced stress, and more effective employees" (n.d.-b). TI uses the fact that no request to dissolve the program have been made as an indicator of its acceptance. Giglio states that the major take away from the TI case study is that "it is important to understand your own corporate culture and what will work best for your company" (n.d.-b). The survey TI conducted served as the gate way to identifying that culture.

Based on the case studies, the AWS seems to be valued by employees because of the flexibility they offer. Each case study demonstrated how large

companies (i.e., Texas Instruments, Kodak, and KPMG) responded with unique solutions to schedule problems identified by employees. Each of the solutions were implemented to help employees achieve a better work/life balance. The flexibility in schedule ultimately benefited the company through anecdotal increases in performance and employee retention. It should be noted that none of the companies have developed any metrics to formally measure improvements in performance.

B. ADVANTAGES AND DISADVANTAGES

Analysis of research data suggests that the personal and professional welfare of employees can ultimately effect the organization. Although many of the advantages and disadvantages of AWS are immeasurable, they remain of importance to organizations because they can significantly impact the personal or professional welfare of employees. In this section, an analysis of advantages and disadvantages of an AWS with respect to performance, morale/job satisfaction, employee absenteeism, health and safety, personal/family commitments, and environmental impacts is provided.

1. Performance

The relationship between employee work schedules and performance is becoming clearer as more companies make the decision to implement alternate work schedule options.

Advantage. As evidenced by the results of case studies examined in Section A, an AWS can have a positive impact on individual and organizational performance. According to Gartenstein, “many employees take time to get into the swing of things, and once they are settled and working, they become more productive” (n.d., Increased Efficency section, para 1). The longer work day can facilitate the uninterrupted flow of work, keeping employee’s momentum going (Gartenstein, n.d., Increased Efficency section, para 1). Knowing that an extra

day off is on the horizon may also improve employee morale, reduce stress and motivate them to work harder to accomplish the mission.

Disadvantage: An employee may set a higher working pace as a result of a desire to complete all work tasks in a shorter work week. In some cases, this fast pace cannot be sustained, negatively affecting organizational performance. According to one article, this is because working harder can cause employees to suffer from “brain drain” or burnout, making them less productive (Gartenstein, n.d., Increased Efficiency section, para 1). According to Humphrey, some research suggests that “[m]ost workers on shorter work weeks need more and longer breaks” (n.d.). A larger overall amount of break time per employee negatively impacts organizational performance.

2. Employee Morale and/Job Satisfaction

Several research studies have shown that employees who work in an environment where they are happy about their contributions to the company have improved performance and work behavior (Williams, 2009).

Advantage: Providing employees the opportunity to work an AWS can make an organization an employer of choice. According to Krueger, “Many employers report higher performance and positive morale from employees who work alternate work schedules. Employees tend to be more satisfied with their jobs, are more involved and committed to the organization, and want to see their employer succeed” (n.d.). An AWS is an inexpensive way to motivate employees and attract and retain highly desirable employees. Having an extra day off without a reduction in pay can increase employee morale and job satisfaction. According to Watson, employee “attitudes towards their job may improve because they are less tired and resentful of the time their career takes up” (n.d.). Additionally, several research studies have shown that employees who work in an environment where they are happy about their contributions to the company have improved performance and work behavior (Williams, 2009).

Disadvantage: Working longer work days can be physically and mentally exhausting to an employee, which can have a negative impact on morale and job satisfaction.

3. Employee Absenteeism

A recent survey found that 66 percent of U.S. workers are calling in sick not because of a physical illness but for other reasons such as family issues, personal needs, entitlement and stress. Absenteeism costs U.S. business billions of dollars each year (“CCH Survey Finds Most Employees Call in "Sick" for Reason Other than Illness,” 2007). The companies predicted that number would increase if lower performance, lost revenue and morale were factored into the equation (“CCH Survey Finds Most Employees Call in "Sick" for Reason Other than Illness,” 2007). The employers surveyed identified AWS as the most effective tool for combating unscheduled absences (“CCH Survey Finds Most Employees Call in "Sick" for Reason Other than Illness,” 2007).

Advantage: An AWS can have a positive impact on employee absenteeism. According to Stillman, an analyst at an employment law firm was quoted as saying that “Most people today are juggling the demands of busy personal and professional lives, and are trying to do their best in both places. Organizations need to stop the tug of war with people for their time, and become a partner to employees to help them, and the business overall, be more successful” (2007). By providing employees a more flexible schedule, they are able to avoid taking personal or sick leave. Instead, they are able to use their extra day off during the week to attend appointments, run errands, and fulfill personal obligations.

A 2009 issue of *TIME* magazine details how a decision by the Government of Utah to implement alternate work schedules resulted in employees taking fewer sick days, improving absenteeism (Walsh, 2009).

Disadvantage: Similar to Employee Job Satisfaction/Morale, employees working an AWS that requires a longer work day could become burnt out and begin to use more personal or sick leave.

4. Health and Safety

The Centers for Disease Control and Prevention states that healthier employees are more productive ("Increase Productivity," 2013).

Advantage: If an AWS provides employees with an additional non-workday, employees may take advantage of that time to exercise. In a study conducted by the State of Utah employees working under an AWS indicated that they exercised more due to their reduced work schedule (Moore, n.d.).

Disadvantage: According to Humphrey, the Canadian Centre for Occupational Health "reported that many workers become more fatigued when assigned to extended workdays" (n.d.). Fatigue can compromise an employee's performance, morale, health and safety. A 2012 *Forbes* article describing a study conducted by the American Journal of Epidemiology suggests that working longer days could cause employees to have poor health, specifically heart disease (DiSalvo, 2012). As the fatigue increases, so too does the risk of a work-related accident occurring.

5. Personal/Family Commitments

Fewer Americans are spending the time with their families necessary to maintain a healthy work and home balance. According to Wheeler, "[s]ince 1969, family time for a working couple has shrunk an average of 22 hours a week, according to the U.S. Government" (2008, p. 1). Instead of spending time with their families, employees are allowing work to supplant their personal time. According to the National Sleep Foundation, "One-third of Americans work 10 hours a day or longer, and one in five spend another 10 hours per week working from home" (Wheeler, 2008, p. 1).

Advantage: Offering employees AWS sends the message that an organization understands the importance of and the benefits associated with an employee's personal time. Moore states, "according to Duke University, an AWS gives employees more time to handle their responsibilities outside of work and personal time, which can allow them to be more focused during work time" (n.d., p. 1). Employees also have the opportunity to better manage their home and work life by spending additional time with their families. According to one article, having an extra day off may help reduce household "expenses associated with commuting, child care and home care for the elderly" (Krueger, n.d., Employee Benefits section, para 1).

Disadvantage: On the contrary, AWS that result in shorter work weeks and longer hours can strain employees. After a longer day of working and commuting, the amount of time available for employees to spend with their families may be limited, leaving only enough time to prepare for the next work day (Humphrey, n.d.). This inability to satisfy daily family needs could cause employee morale to suffer and introduce punctuality problems within the organization (Watson, n.d.). According to Watson, "organizing childcare for longer working hours could prove difficult, as could leaving the house very early, particularly if workers have young children" (n.d., p. 2).

6. Environmental Benefits

Alternate work schedules that reduce the total number of work days can have an environmental benefit. The energy that employees would normally consume in the office or while commuting is saved on their day off.

Advantage: The state of Utah conducted a trial study on the use of a compressed work schedule in 2009. 17,000 of the state's 21,000 employees were transitioned to the compressed work schedule (Brundin, 2009). Employees worked a four-day, 10-hour work schedule that included Fridays off (Brundin, 2009). Kilowatt hours were monitored by Energy Specialist in order to track any

reductions in energy usage (Brundin, 2009). The state reported a 13 percent reduction in energy use after one year, which fell short of its 20 percent goal (Brundin, 2009).

Another study that was conducted by the University of California, for the California Environmental Protection Agency Air Resource Board, revealed trip and mileage benefits for employees on compressed work schedules (Holmes, 1995). The study focused on 530 California employees who used a trip diary to collect data over a seven day period in order to compare against a traditional schedule (Holmes, 1995). Several factors were considered during the study (i.e., the employee's mode of transportation, number of cars owned by the employee, the employee's travel distance to work, whether the employee was a driver or passenger, and the fact that some employees may drive on their day off) (Holmes, 1995). Results of the study indicate employee's trips were reduced by about a half to a whole trip per week and their mileage by 13–20 miles per week, while working a compressed work schedule (Holmes, 1995). The trip reductions took place in the morning and afternoon, which is believed to have a positive impact on air quality and congestion (Holmes, 1995).

Disadvantage: None found

C. SUMMARY OF CHAPTER

This chapter reviewed the use of AWS at three major U.S. corporations and summarized a list of advantages and disadvantages of AWS. As a matter of perspective, it may appear that the advantages and disadvantages of and AWS are equal. However, the case studies demonstrate that many of the advantages satisfy employee needs, which may be worth the risk of the disadvantage occurring. By implementing AWS, companies such as Texas Instruments, Kodak, and KPMG have validated employee concerns over their ability to satisfy both professional and personal responsibilities. These case studies also demonstrate how employee feedback can be used to improve operational performance. This

chapter satisfied research objectives one and two and the information included in this chapter will be considered in Chapter IV, Conclusions and Recommendations. The next chapter will discuss the collection and analysis of data and will provide a comparison of ATC to the benefits, advantages, and disadvantages described in Chapter II.

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III. DATA COLLECTION AND ANALYSIS

Chapter II described benefits, advantages, and disadvantages of AWS obtained from a review of existing literature providing a baseline for comparison to ATC. This chapter will accomplish research objective three (determine the impact of an alternate work schedule on performance during testing at ATC) and research objective four (provide an analysis of ATC against the benefits, advantages, and disadvantages identified Chapter II). The chapter will consist of seven sections:

Section A: ATC Performance Analysis: Data Collection

Section B: ATC Performance Analysis: Assumptions

Section C: ATC Performance Analysis: Methodology, Results and Limitations

Section D: ATC Absenteeism Analysis

Section E: ATC Safety Analysis

Section F: Overall Analysis of ATC

Section G: Summary of Chapter

The data presented in these sections will be pertinent to the development of the recommendations in Chapter IV. The data will also be valuable to the ATC Command group, as decision-makers, while determining the impact of traditional and alternate work schedules on performance during testing.

A. ATC PERFORMANCE ANALYSIS DATA COLLECTION

From 2013 to 2014, ATC operated on both a traditional schedule and an AWS (see Figures 1 and 2). To determine the impact of these schedules on performance, test data from each of these periods was pulled from ATC's internal databases and compared. Traditional schedule data was pulled from June 30 to November 30, 2013. AWS data was pulled from December 1, 2013 to March 31, 2014. Two types of testing were examined: automotive reliability, availability, and maintainability (RAM) testing and body armor ballistic testing. These types of

testing were chosen as they contain the highest volume of projects linked to major acquisition programs. All analytical comparisons were made between the traditional and the AWS based on a two week 80 hour pay period.

B. ATC PERFORMANCE ANALYSIS: ASSUMPTIONS

The following are assumptions that were made during the analysis of all data:

- All testers/operators followed standard and internal operating procedures correctly
- No excessive or abnormal down-time
- Tests conducted during the analysis timeframe were “typical”

C. ATC PERFORMANCE ANALYSIS: METHODOLOGY, RESULTS AND LIMITATIONS

This section will provide a review of the performance analysis conducted on ATC test data. Also highlighted are the methodology, results, and limitations of each performance analysis conducted.

1. Automotive Testing

Details of the analysis of automotive test data are provided in the subsequent text.

Methodology: A total of five automotive projects encompassing nine different vehicle variants were selected for this analysis. The systems under test were active during both AWS and traditional schedules, had a significant amount of RAM mileage, and represented both tactical and combat vehicle types. While total mileage seems like a logical choice for comparison, test plans often call for different courses to be run at varying distances, adding a large degree of variability to the total miles driven. Additionally, adverse weather and course conditions impact total mileage for a given time period. For example, a test item driving on a dry paved test track will yield many more miles than the same amount of time on a muddy, rough terrain course.

To compensate for these variables, performance was instead measured by examining the total time the vehicle was being used in testing (uptime) or sitting idle (downtime). The uptime and downtime was logged by the drivers conducting the test using an electronic drivers log (EDL). The average uptime and downtime across all projects is shown in Table 7. To compare performance, the average uptime and downtime was extrapolated to an 80-hr pay period (Table 8). Figure 2 shows the difference in total uptime for eight hour and nine hour work days.

Table 7. Average amount of uptime and downtime for automotive testing conducted during the traditional and AWS

Shift:		**8-Hr Day**	**9-Hr Day**
Vehicle ID:		**ALL**	**ALL**
Total Number of Days		260	384
Downtime (min)	Start of Shift	34	35
	AM Break	15	15
	Lunch	30	30
	PM Break	15	15
	End of Shift	35	32
	Total	129	127
Uptime (min)	Per Shift	351	413

Table 8. Total automotive uptime per pay period on the traditional and AWS

	Traditional (5-40)	AWS (9-80)
Uptime per Pay Period (hrs)	58	61
AWS Efficiency	4.0%	

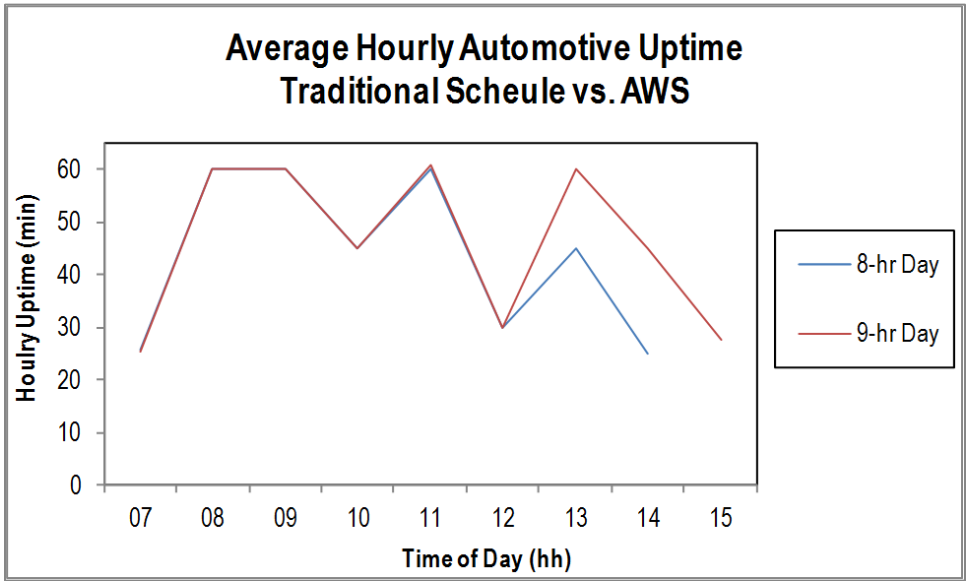

Figure 2. Average hourly automotive uptime during the traditional and AWS schedule

Results: Analysis showed that on average, there is a four percent increase in testing performance while operating on an AWS. This is because with automotive RAM testing, the drivers adhere to a strict schedule regulating break times. While start-up and shut-down times are more variable, they are consistently around 30 minutes each. The RDO of the AWS results in one less day of total downtime and contributes an extra three hours of productive uptime during the pay period.

Limitations of Analysis: The analysis did not use a random sampling of project data; it targeted projects that were conducted during the traditional and the alternate work schedule periods. The projects with the most RAM miles that met these criteria were used. Additionally, the analysis relied on data recorded by the test driver using ATC's internal uptime logging application, which can be subject to human error.

2. Body Armor Testing

Details on the analysis of body armor test data will be provided in the subsequent text.

Methodology: Rounds fired per hour at ATC body armor test ranges were collected on the traditional schedule from June 30, 2013 to November 30, 2013 and on the AWS from December 1, 2013 until March 31, 2014.

During the traditional schedule, metrics were collected for 22 weeks, or 11 pay periods with a total of 91 testing days recorded across 45 projects. A total of 21,848 rounds were fired during the traditional measurement period. Figure 3 shows the average rounds fired per hour for each pay period during the traditional schedule data collection. During the AWS, metrics were collected for 17 weeks, or 9.5 pay periods with a total of 70 testing days recorded across 36 projects. A total of 17,002 rounds were fired during the AWS measurement period. Figure 4 shows the average rounds fired per hour for each pay period during the AWS data collection.

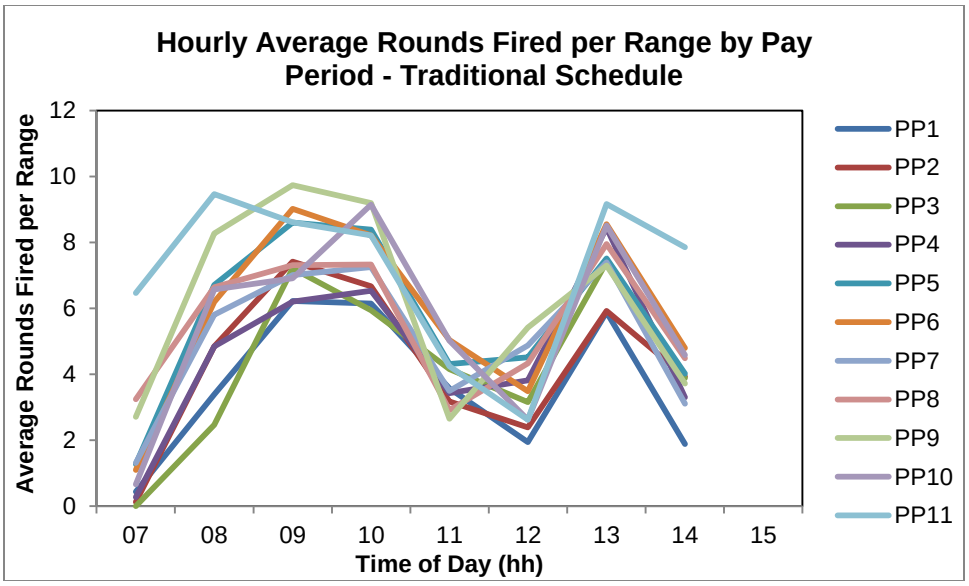

Figure 3. Hourly average rounds fired per day by pay period (PP) during the traditional schedule

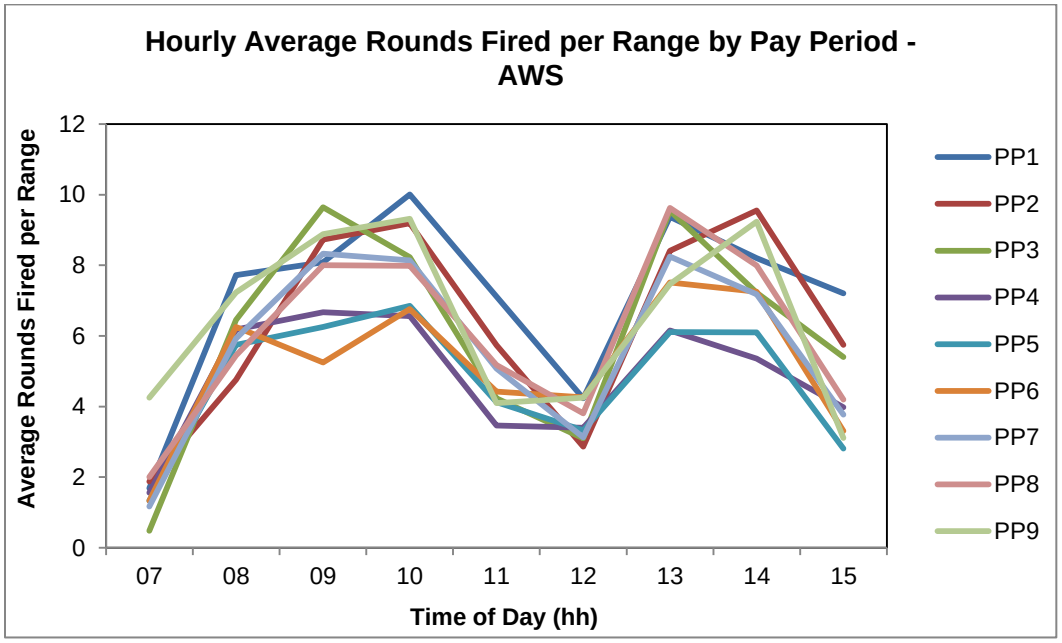

Figure 4. Hourly average rounds fired per day by pay period (PP) during the AWS

During each of the measurement periods, up to nine test ranges were simultaneously active. To account for variation in the number of ranges, the number of rounds fired per hour was normalized by the number of active ranges during the same time period. The hourly number of rounds fired per active range was summed for each pay period. To account for furlough, holiday, or other periods when no firing occurred, the total number of rounds per active range for each pay period was normalized by the total number of active hours. The resulting rounds per range, per hour were then extrapolated to an 80 hour work week. The data for the traditional and AWS are shown in Table 9 and 10, respectively.

Table 9. Body armor testing performance during traditional work schedule

Pay Period	Total Shots per Range	Total Hours	Shots per Range per Hour	80 Hour Extrapolation
1	266	64	4.2	336
2	276	56	4.9	392
3	274	56	4.9	392
4	406	80	5.1	408
5	408	64	6.4	512
6	510	80	6.4	512
7	322	56	5.8	464
8	398	54	6.2	496
9	539	80	6.7	536
10	367	64	6.2	496
11	510	64	8.0	640

Table 10. Body armor testing performance during AWS

Pay Period	Total Shots per Range	Total Hours	Shots per Range per Hour	80 Hour Extrapolation
1	487	71	6.9	552
2	444	71	6.3	504
3	380	63	6.0	480
4	347	71	4.9	392
5	384	80	4.8	384

Pay Period	Total Shots per Range	Total Hours	Shots per Range per Hour	80 Hour Extrapolation
6	320	62	5.2	416
7	459	71	6.5	520
8	479	80	6.0	480
9	347	53	6.5	520

The average and standard deviation of the total number of rounds fired per pay range during the traditional pay period was 471 (± 61) rounds per range, per pay period. The average and standard deviation of the total number of rounds fired per range during the AWS was 425 (± 60) rounds per range, per pay period.

Results: While it appears the AWS may be less efficient than the traditional Schedule, it is important to note that the standard deviations overlap. A student's t-test shows the populations are statistically the same, with a p-value of 0.98. There is no statistical difference between the testing performance of the traditional and AWS for body armor testing.

Limitations of Analysis: This analysis does not use a random sampling of project data; it targeted projects that were conducted during the traditional and the alternate work schedule periods. The variability of workload and test mission is inherent to ATC's test mission. Because body armor tests have varying amounts of articles to test, require multiple shots to the same piece of armor, and varying projectile types, it is difficult to characterize a "standard" dataset. Reducing the data to rounds fired per range, per hour, then extrapolating an 80-hour work week, provided some compensation for fluctuations in workload and range closures due to holidays, furlough, etc. Looking across multiple pay periods increased the sample size and provided a meaningful dataset for analysis.

D. ATC ABSENTEEISM ANALYSIS

To understand the impact of an AWS on absenteeism, an analysis of ATC civilian leave usage was performed. Civilians make up about 50 percent of ATC's total population; the other 50 percent is contractor support. Four months (1 July–1 November) of leave data from 2012 and 2013 was reviewed to assess civilian employee's use of leave without pay, annual leave, advance annual leave, sick leave, and advance sick leave during traditional schedule and an AWS. A total of 837 civilian employees were represented during the 2012 assessment and 797 civilian employees were represented during the 2013 assessment.

Leave reports from the DOD Automated Time Attendance and Production System (ATAAPS) were provided by ATC's Budget Office. Analysis of the leave data revealed that employees charged more leave hours while working an alternate work schedule than a traditional work schedule. Figures 5 and 6 show the number of hours charged for each leave category by ATC employees in 2012 and 2013.

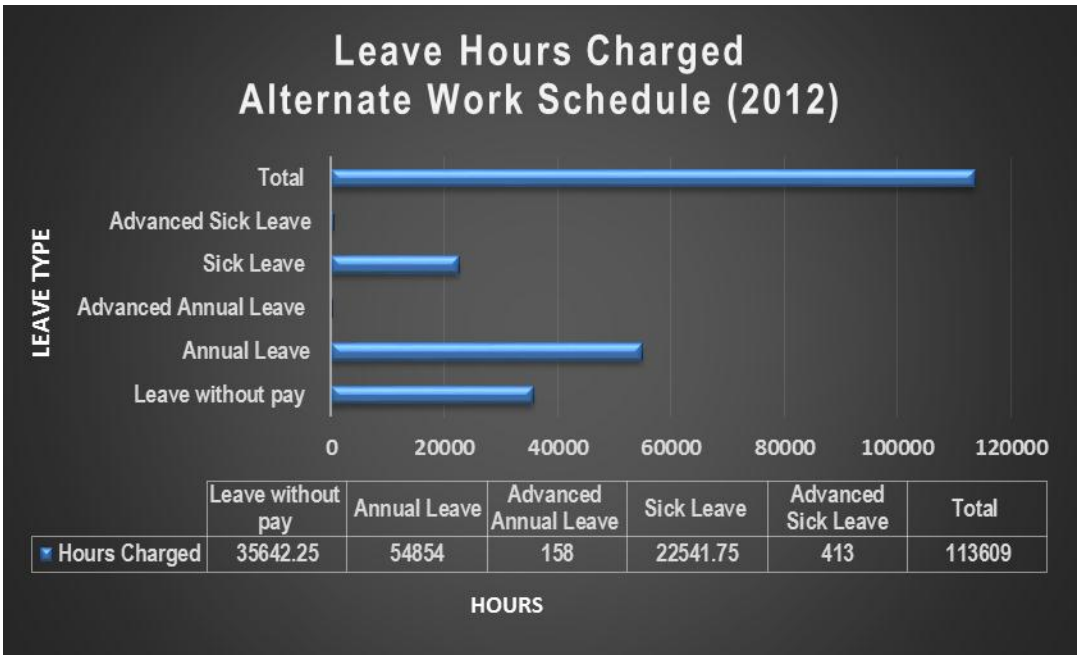

Figure 5. Leave hours charged by ATC employees in 2012

Figure 6. Leave hours charged by ATC employees in 2013

Employees charged approximately 21,000 more hours of leave while working an AWS between 1 July and 1 November of 2012 than while working a traditional schedule between 1 July and 1 November of 2013. One consideration that should be made is that employees were required to take 38,356 hours (six furlough days) of unpaid leave during July and August of the assessed period in 2013. This additional unpaid leave may account for less traditional leave hours being charged.

E. ATC SAFETY ANALYSIS

To understand the impact of an AWS on employee health and safety, an analysis of commander's critical information reporting (CCIR) from October 2012 to October 2013 was conducted. A CCIR is an electronic reporting tool used by ATC employees to report specific details of critical incidents and safety violations to the commander. CCIRs were reviewed and categorized by personnel injury, damaged vehicles, damage to equipment, and forklift accidents. Personnel Injury

were limited to occupational health injuries. Table 11 shows the monthly breakdown by category.

Table 11. ATC health and safety CCIRs by month, October 2012 to October 2013

FY13	AWS									Traditional Schedule			
	Oct -12	Nov -12	Dec -12	Jan -13	Feb -13	Mar -13	Apr -13	May -13	Jun -13	Jul -13	Aug -13	Sep -13	Oct -13
Personnel Injury	3	3	4	1	2	8	2	1	3	2	3	4	2
Vehicle Damage	6	2	4	7	2	8	5	1	3	4	2	1	4
Property Damage	1	1	1	3	1	2	0	2	4	0	2	2	0
Forklift Accidents	1	2	0	0	2	0	0	1	0	1	1	3	2
Total	11	8	9	11	7	18	7	5	10	7	8	10	8

CCIRs submitted from October 2012 to June 2013 were under the AWS, CCIRs submitted from July 2013 to October 2013 were under the traditional schedule. During the AWS, an average of 10 (± 4) CCIRs per month were submitted. During the traditional schedule, an average of 8 (± 1) CCIRs per month were submitted. A Student's t-test shows there is no statistical difference between the number of CCIRs collected during either work schedule.

F. OVERALL ANALYSIS OF ATC

To understand how an AWS can benefit ATC, each of the AWS elements identified in Chapter II are considered

1. AWS Elements

Performance: Prior to this analysis, there was no documented information regarding ATC's decision to implement an AWS. Analysis performed in Section C of this chapter suggests that there is a slight performance efficiency gained with an AWS for automotive RAM testing. This is because this type of testing has a standard daily set up and tear-down time associated with the execution of the

test. An AWS eliminates a day; one daily iteration of set up and tear down time from the schedule (RDO), allowing that process downtime to be converted to productive testing time. However, body armor testing does not see the same benefit of the AWS as this type of testing does not require much start-up and tear-down time each day. Another AWS benefit to performance is the ability for the customer to use the RDO to work an entire day of overtime, increasing schedule performance. This is especially beneficial for rapid initiatives and other program managers on tight schedules. This analysis shows that an AWS results in a neutral to positive effect on performance at ATC.

Morale/Job Satisfaction: Alternate work schedules have been a part of ATC's culture for many years. Employees have become accustomed to having an extra day off, biweekly. A Defense Equal Opportunity Management Institute (DEOMI) organizational climate survey was taken by ATC employees in April 2014. This was after ATC re-implemented the AWS on 1 December 2013. The survey's results indicated 81 percent of employees had a high job satisfaction (Defense Equal Opportunity Mangement Institute, 2014). While this cannot be tied directly to the AWS, it is a point of interest for monitoring in future studies.

Employee Absenteeism: Analysis of ATC's leave data in 2012 and 2013 revealed that employees charged more leave hours while working an AWS than a traditional schedule. However, it is important to consider that employees were required to take six furlough days of leave without pay during the traditional schedule period. This additional unpaid leave may account for less traditional leave hours being charged as employees may have leveraged the furlough days as part of previously planned leave or to take care of personal commitments. As a result, there is no clear link between the AWS and absenteeism at ATC.

Health and Safety: Dependent upon the type of work an ATC employee performs, working longer days and becoming fatigued could increase their risk of being involved in an accident, which can have damaging effects on the organization. For example, a fatigued driver might neglect to acquire a ground

guide and as a result, back into another vehicle. However, when the number of CCIRs collected in 2012–2013 during the traditional and the AWS were compared, there was no statistical difference in the number of CCIRs submitted. This indicates that work schedule does not impact the health and safety of ATC employees.

Personal/Family Commitments: The impact of an AWS on ATC employee's personal or family commitments has never been assessed. An employee survey would need to be conducted in order to properly understand the impact of an AWS on these commitments.

Environmental Benefits: ATC occupies a large number of buildings on Aberdeen Proving Ground. However there is no evidence of an analysis being performed to identify if there are costs savings associated with ATC's use of an AWS.

Interestingly, results from a study conducted by the U.S. Army's Communications-Electronics Command (CECOM) on the use of a four-day, 10-hour compressed work schedule at Fort Monmouth, New Jersey, showed a less than two percent savings on annual utility costs of $12 million (Potter, Curran , & Bellavance, 1994). These calculations were generated by making adjustments to sample electricity usage data in order to simulate a 10-hour work day (Potter et al., 1994). The study identified utility usage peak hours as those between 0900 and 1600. It also described gradual "ramp up" and "ramp down" times before 0900 and after 1600 (Potter et al., 1994). By moving to a four-day work week, peak hours are extended by two hours and only one ramp up and ramp down is saved each week (Potter et al., 1994). Although the CECOM schedule is not identical to the one used by ATC, the study could serve as an indicator that the costs savings for ATC would also be minimal.

One area where costs savings may be gained is ATC employees commute to and from work. Assuming ATC employees limit their trips during the RDO, it is likely that a reduction in employee's personal energy usage, mileage,

and fuel costs is experienced. As evidenced by the study conducted on employees working a compressed work schedule in the state of California, ATC employee trip reductions during peak hours likely improve air quality.

2. Applicability to Case Study Results

Although, the specific types of AWS used by KPMG LLP, Eastman Kodak and TI varied in order to meet their individual company needs, each company's results are applicable to ATC.

KPMGs desire to be the employer of choice and to increase employee retention served as the basis for offering employees an AWS. ATC employs highly skilled scientists, technologists, engineers, and mathematicians. Obtaining and retaining employees with these in-demand skillsets can be difficult for any organization. It is possible that like KPMG, ATC's success in retaining such employees and maintaining performance is somewhat attributed to the implementation of an AWS.

Eastman Kodak did not wait for employees to request an AWS. Instead, the company proactively responded to changes its cultural by offering employees several AWS options. Unlike Kodak, the reasons for ATC's initial decision to implement an AWS are unknown. However, Kodak's approach is not unique when compared to ATC. As outlined in Chapter I, ATC's leadership was proactive in transitioning employees back to a traditional schedule in order to lessen the impact of furloughs on employees. This proves that ATC leadership recognizes and adjusts to conditions that may impact employee performance.

TI's employee survey exposed employee needs and attitudes concerning schedule flexibility within the company. ATC has never offered employees a survey that would assess the impact that the AWS has on employees, their work, or their personal lives. Based on survey results, TI offered employees compressed work schedules and the ability to make ad hoc schedule changes. Unlike corporate America, ATC does not possess the flexibility to manipulate

employee schedules in an ad hoc manner, but can learn how to identify and address employee needs from what TI has accomplished.

The choice to improve the wellbeing of employees can pay back huge dividends in company success. However, the lack of performance metrics from the case studies make it difficult to measure the business impact of AWS programs implemented in each company. Because these large corporations are very successful and have to answer to shareholders, one can confidently assume that the AWS did not have a significantly negatively impact on business operations.

G. SUMMARY OF CHAPTER

This chapter described a comparison of benefits, advantages, and disadvantages to factors identified in existing literature to ATC. Additionally, analysis of automotive and body armor test data, leave usage, and CCIRs was conducted during periods of traditional schedule and AWS in 2013. As a result, an AWS was found to be neutral to marginally beneficial for performance of testing. Employee absenteeism appears to favor the traditional schedule, but the data may be skewed by forced unpaid leave from furloughs. There was no statistical difference between the number of CCIRs collected during either schedule. Morale, personal/family commitments, and environmental impacts were only analyzed empirically. Future studies should include employee surveys to address these factors.

This chapter satisfied research objectives three and four and research question number three. Chapter IV will accomplish research objective four by recommending the most efficient work schedule to ATC leadership based on the results of this project

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IV. CONCLUSION AND RECOMMENDATION

The use of AWS is becoming increasingly popular amongst organizations trying to improve both the welfare of their employees and businesses efficiency. An AWS is not a “one size fits all” concept, but for many organizations, it can create an environment rich with opportunities to improve employee work-life balance, while successfully accomplishing the mission. This project examined AWS advantages and disadvantages and developed a comprehensive business case analysis of testing performance at ATC. Results show variation in the outcomes of analysis conducted.

A thorough literature review in Chapter II addresses research question one (can ATC use other organizations as a model for improving operations through work schedule changes?) by demonstrating how three large companies have taken advantage of the opportunity to address employee concerns by offering alternatives to the traditional work schedule. These case studies established that the AWS resulted in a positive work life balance, which in-turn fostered improved employee performance. As a result, the implementation of AWS provided positive results for each of the companies. Additionally, a thorough literature review revealed a wide variety of benefits, advantages, and disadvantages of an AWS that served as a baseline for comparison to ATC.

Chapter III addresses research questions two and three (what are the advantages or disadvantages of an AWS and can test efficiencies be gained through working an AWS as opposed to a traditional schedule?) and compared the benefits, advantages and disadvantages of elements associated with AWS to ATC. Factors such as performance, morale, absenteeism, and environmental concerns were considered. Performance was measured by comparing testing efficiency as a measure of business effectiveness. The data showed that the AWS is comparable or more efficient than the traditional schedule. Uptime and downtime proved to be a better metric than miles driven in determining test

efficiency as it shows overall performance. Uptime may be a useful metric in studying the efficiencies of testing conducted by other Directorates within ATC in the future.

An analysis of body armor test data showed that there is no significant difference in test performance when ATC is operating on a traditional or an AWS. It appears that this type of acquisition based testing is not impacted by changes to schedule and ATC should not expect to reap great performance rewards that are attributed to longer or shorter work days. The organization will find greater value and be able to improve performance by maintaining the current work schedule as it helps employee morale and job satisfaction.

The results of an analysis of ATC leave reports showed that employee absenteeism was greater while working an AWS than while working a Traditional Schedule. As previously mentioned, the reduction in leave charged during the traditional schedule may be attributed to the six furlough days of unpaid leave that employees were required to take in 2013. In addition an analysis of health and safety data, specifically CCIR occurrences, was performed. The results indicate that there appears to be no statistical difference between the number of CCIRs collected during either work schedule

Determining whether the advantages or disadvantages of using an AWS are greater is dependent upon the organization's needs. During the literature review, most of the AWS factors that were considered, presented advantages and disadvantages, making neither more prominent. The test efficiency data reviewed at ATC showed that the AWS is comparable or marginally more effective than the traditional schedule. Overall, this project served as confirmation that, the advantages of using an AWS outweigh the disadvantages, an AWS can directly affect performance, and that commercial companies that use an AWS support the notion that it improves performance.

The use of AWS appears to affect performance, therefore recommend that ATC consider performing analysis on test data from other areas within the

command to determine the overall performance efficiency of the AWS. Additionally, a future study should consider a survey of employee's perceptions of the AWS on factors such as performance, morale, and personal/family commitments

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LIST OF REFERENCES

Amabile, T., & Kramer, S. (2012, February). Employee happiness matters more than you think. *Businessweek*. Retrieved May 29, 2014, from http://www.businessweek.com/debateroom/archives/2012/02/employee_happiness_matters_more_than_you_think.html

Automotive directorate. (n.d.). Retrieved July 7, 2014, from http://www.atc.army.mil/directorates/Automotive.html

Brundin, J. (2009, April 10). Utah finds surprising benefits In 4-day workweek. Retrieved August 08, 2014, from http://www.npr.org/templates/story/story.php?storyId=102938615

Budget sequestration in 2013. (2014, July 16). *Wikipedia*. Retrieved July 08, 2014, from http://en.wikipedia.org/wiki/Budget_sequestration_in_2013

CCH survey finds most employees call in 'sick' for reason other than illness. (2007, October 10). Retrieved from http://www.cch.com/press/news/2007/20071010h.asp

Increase productivity. (2013, October 23). Retrieved August 4, 2014, from Centers for Disease Control and Prevention http://www.cdc.gov/workplacehealthpromotion/businesscase/benefits/productivity.html

Continuing Appropriations Act, 2014. (2014, January 15). *Wikipedia.* Retrieved July 24, 2014, from http://en.wikipedia.org/wiki/Continuing_Appropriations_Act,_2014

Defense Equal Opportunity Mangement Institute (DEOMI). (2014, May 23). *DEOMI organizational climate survey (DEOCS) report*. Patrick Air Force Base, FL: Defense Equal Opportunity Mangement.

DiSalvo, D. (2012, September 12). Pharma & healthcare: why working more than 8 hours a day can kill you. Retrieved May 15, 2014, from http://www.forbes.com/sites/daviddisalvo/2012/09/12/why-working-more-than-8-hours-a-day-can-kill-you/

Firepower directorate. (n.d.). Retrieved July 07, 2014, from http://www.atc.army.mil/directorates/Firepower.html

Furlough 2013 questions and answers. (2013). Retrieved 10 July, 2014, from Department of Defense, Defense Civilian Personnel Advisory Service http://www.cpms.osd.mil/Content/Documents/2013%20Furlough%20FAQs.pdf

Gartenstein, D. (n.d.). Advantages & disadvantages of compressed work schedules. Retrieved May 15, 2014, from http://www.ehow.com/list_5772018_advantages-disadvantages-alternate-work-schedules.html

Giglio, K. (n.d.-a). Workplace flexibility case study. Retrieved May 22, 2014, from https://workfamily.sas.upenn.edu/sites/workfamily.sas.upenn.edu/files/imported/pdfs/texas_instruments.pdf

Giglio, K. (n.d.-b). Workplace flexibility case study KPMG LLP and job sharing. Retrieved 21 May, 2014, from https://workfamily.sas.upenn.edu/sites/workfamily.sas.upenn.edu/files/imported/pdfs/KPMG.pdf

Heathfield, S. M. (n.d.). Human resources: advantages and disadvantages of flexible work schedules? Retrieved May 15, 2014, from http://humanresources.about.com/od/employeebenefits/f/flex_schedules.htm

History. (n.d.) Retrieved July 07, 2014, from http://www.atc.army.mil/history.html

Holmes, J. R. (1995, June). Research note 95–12-workweek alterations and employee travel. Retrieved August 20, 2014, from http://www.arb.ca.gov/research/resnotes/notes/95-12.htm

Humphrey, A. (n.d.). The disadvantages of a compressed work week. Retrieved May 2014, 15, from http://www.ehow.com/list_6039423_disadvantages-alternate-work-week.html

Krueger, P. (n.d.). What are the benefits of an alerternate work week? Retrieved May 15, 2014, from http://www.ehow.com/list_5978690_benefits-alternate-work-week_.html

Litchfield, L. C., Swanberg, J. E., & Sigworth, C. M. (2004, April). *Increasing the visibility of the invisible workforce: model programs and policies for hourly and lower wage employees*. Boston, MA: Boston College Center for Work & Family Carrol School of Management. Retrieved May 21, 2014, from http://www.bc.edu/content/dam/files/centers/cwf/research/publications/pdf/LowWageStudy.pdf

Memorandum for secretaries of the military departments.(2013, May 14) [Memorandum]. Washington, DC: Secretary of Defense

Moore, S. (n.d.). The advantages of a compressed work week. Retrieved from http://www.ehow.com/list_6067091_advantages-compressed-work-week.html

Office of Personnel Management . (2011, April). Guide to telework in the federal government. Retrieved from http://www.telework.gov/guidance_and_legislation/telework_guide/telework_guide.pdf

Office of Personnel Management. (n.d.-a). Policy: hiring authorties. Retrieved July 08, 2014, from http://www.opm.gov/policy-data-oversight/hiring-authorities/part-time-and-job-sharing/

Office of Personnel Management. (n.d.-b). Policy: pay & leave, reference materials. Retrieved July 08, 2014, from http://www.opm.gov/policy-data-oversight/pay-leave/reference-materials/handbooks/alternative-work-schedules/#AWS

Potter, M., Curran, K. & Bellavance, K. (1994). *Four day workweek at Fort Monmouth, NJ :cost savings and feasibility study*. Fort Monmouth, NJ: U.S. Army Communications-Electronics Command, Directorate for Resource Mangement.

Stillman, J. (2007, October 12). How to Reduce Absenteeism. *CBS News*. Retrieved May 15, 2014, from http://www.cbsnews.com/8301-505125_162-28041076/how-to-reduce-absenteeism/

U.S. Army Aberdeen Test Center. (n.d.). *Automated Time Attendance and Production System (ATAAPS) leave report* . Aberdeen Proving Ground, MD: U.S. Army Aberdeen Test Center July 17, 2014

U.S. Army Combat Systems Test Activity. (1993, July 1). Civilian personnel, alternative work schedule . *CSTA Regulation No 690-9*. Aberdeen Proving Ground , MD: U.S. Army Combat Systems Test Activity

U.S. Army Test and Evaluation Command. (n.d.). *U.S. Army Test and Evaluation Command* [Brochure]. Aberdeen Proving Ground, MD: U.S. Army Test and Evaluation Command.

U.S. job satisfaction at lowest level in two decades. (n.d.). *Newswire*. Retrieved July 10, 2014, from http://www.prnewswire.com/news-releases/us-job-satisfaction-at-lowest-level-in-two-decades-80699752.html

Walsh, B. (2009, September 7). The four-day workweek is winning fans. *Time Magazine*. Retrieved from http://content.time.com/time/magazine/article/0,9171,1919162,00.html

Watson, E. (n.d.). Advantages & disadvantages of a 4-day work week. Retrieved May 15, 2014, from http://www.ehow.com/info_8629785_advantages-disadvantages-4day-work-week.html

Wheeler, T. (2008, August 27). Work-life balance: Why you need it & how to get it. Retrieved May 15, 2014, from http://allhealthcare.monster.com/benefits/articles/2161-work-life-balance-why-you-need-it-how-to-get-it

Williams, R. (2009, March 07). Are happy employees more productive? *EZine*. Retrieved July 10, 2014, from http://ezinearticles.com/?Are-Happy-Employees-More-Productive?&id=2075758

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